



AMETEK CONTROLS DIVISION

FEASTERVILLE, PA. 19047

MAINTENANCE AND OPERATING INSTRUCTIONS

12" RECORDERS

A M E T E K

12" RECORDERS W/
PSYCHROMETRIC INSTRUCTIONS

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GENERAL

These instructions are intended to cover Ametek Controls Division, RX12 Series, 1-pen, 2-pen, 3-pen and 4-pen Recorders.

The instructions are written sufficiently general so as to cover all these types, whether they are actuated by vacuum, pressure or temperature.

INSTALLATION

Mounting of Case

Instrument should be mounted vertically on wall or panel where it will be free from vibration, moisture, and large fluctuations of temperature. For wall or surface mounting turn L-brackets to provide lugs flush with back of instrument. For panel mounting, turn L-brackets to act as clamps on the back of the panel.

1. Temperature Recorder

Install the bulb at the point where the temperature is to be measured. Avoid location near heating, or cooling coils or near an open steam inlet. However, locate where good circulation or agitation is assured as this will reduce thermal lag to a minimum and improve the quality of the record. For separable socket bulbs, a graphite compound is provided to assure good conductivity between socket and bulb.

In laying the connecting tubing, avoid sharp bends of radius less than 3". **CAUTION:** (Never cut the connecting capillary.)

2. Pressure Recorder

Connect the instrument to the point at which pressure is to be measured. Use 1/4" pipe or 3/8" tubing. For

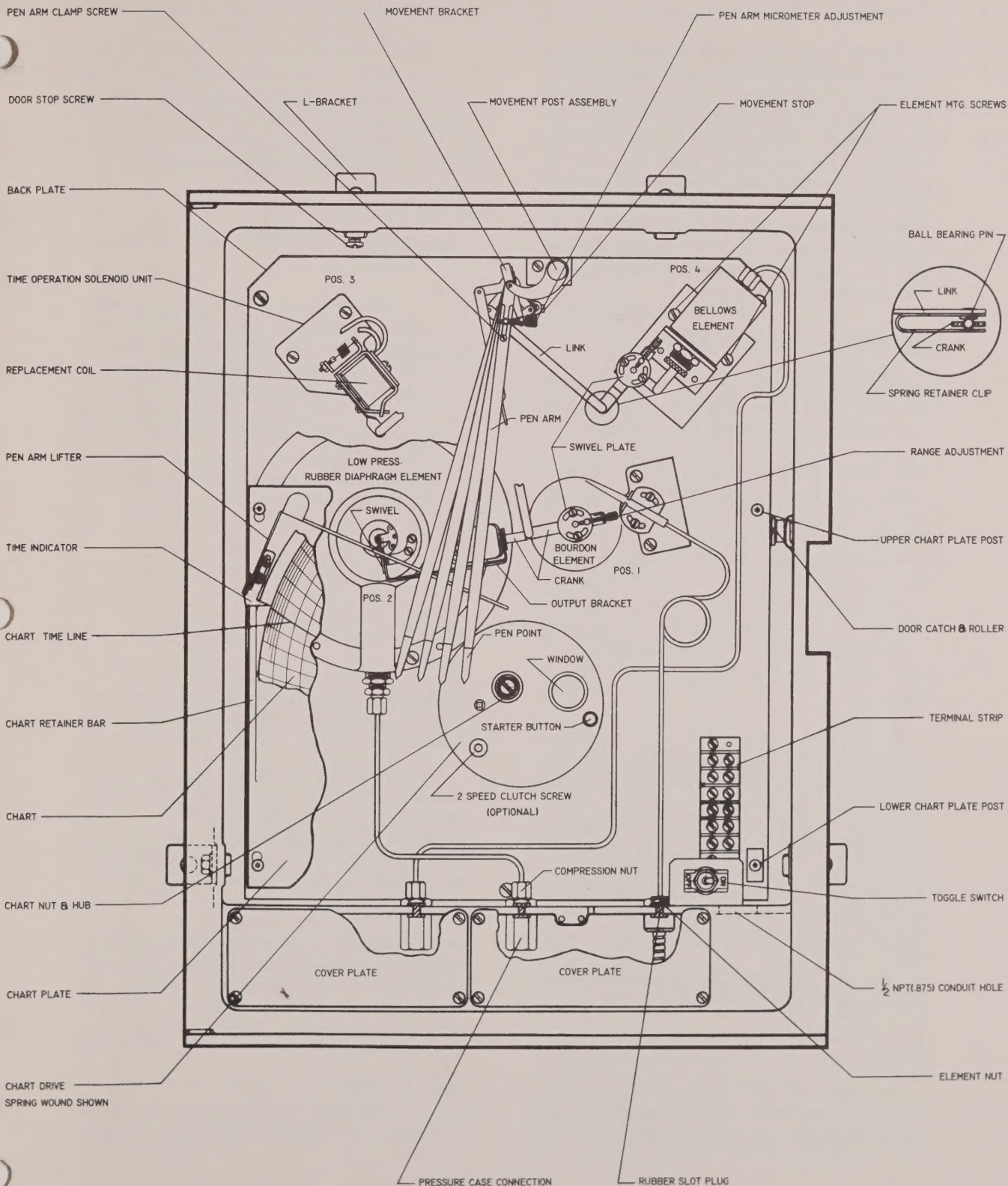
high pressures, standard plant practice should dictate line size. Excessive pulsation which can cause poor record may be damped out by use of a partially closed needle valve or a porous metal snubber installed at the instrument pressure connection. Connection should be made to allow entrapped vapors to escape back to process. For pressure measurement of wet gases, piping should be sloped to permit drainage of lines back to process. For pressure measurement of steam or hot condensable gases, a pigtail siphon at the instrument connection will prevent hot vapors from entering instrument.

For corrosive media, a chemical attachment at the instrument or at the process hydraulically connected to instrument, must be used to isolate the instrument Bourdon from the corrosive fluid.

Electrical Connections

For alarm connections or electric chart drive, a 1/2" conduit hole is furnished in the bottom shelf at the right side. Rigid or flexible conduit may be connected at this point.

A terminal strip at the lower right side is provided to make electrical connection.



Preliminary Adjustments

Remove cork spacers from pen arms and verify whether pen is indicating correct pressure or temperature. Jarring and handling during shipment and installation may cause pen to read slightly off. For pressure recorders, the pen should point to zero with process pressure off. For temperature recorders, the bulb should be subjected to the same conditions as a thermometer of known accuracy. If there is a discrepancy, the pen may be moved by adjustment of the micrometer screw on the pen arm.

Compensation For Head Effect

When the recorder is at a different level than the point of measurement, a correction for static head may have to be made.

1. Temperature Elements

- a. For mercury, organic liquid, or gas-

filled elements, there is no head correction necessary.

- b. For vapor actuated elements, if the bulb is elevated differently with respect to the case from when it was calibrated at the factory, it is necessary to adjust the pen. See Preliminary Adjustments above.

2. Pressure Elements With A Liquid-Filled Leg

Pen must be moved upscale when the instrument is above line and downscale when below. The correction is equal to 1 psi for each 27.7 inches of water (measured vertically). For other liquids correction is proportional to the specific gravity. It is often convenient to install a precision gauge at the pressure tap and make instrument reading agree with it.

MAINTENANCE

Chart

To replace a chart, first lift pens from chart surface by pulling on lifter tab. Turn chart nut one turn counterclockwise. This will retract the retaining fingers. Remove chart. In putting on new chart, be sure to get edge of chart under time indicator pointer and under retaining bars at each side. The center of chart must rest against rubber drive ring. Turn chart until proper time is indicated, and clamp by screwing down on chart nut.

Pens are automatically returned to chart surface when door is closed.

Pens

Use only the ink supplied, fountain pen ink or any other will clog or corrode the pen. If pen does not touch paper, bend pen arm

slightly at the point where the pen arm joins the pen arm bracket. The pen should ride as lightly as possible on the chart surface.

For single pen recorders, the pen should follow the time line arc. For two pen recorders with V-pens, the arcs are very close together and each approximates the time line arc. For two, three and four pen recorders which use box pens, only the red pen follows the time arc.

Adjustments in the pen arm length to obtain better tracking to time arc may be made at clamp screw at upper end of pen arm. Be sure pen continues to indicate correctly after this adjustment. If not, adjust value with micrometer screw.

1. V-Pens

Fill with only one or two drops of ink. To start, tap pen lightly on chart

or touch with end of dropper to wet pen point.

2. *Box Pens*

Fill half full and remove shipping wire. Wet point with end of ink dropper and tap lightly against chart. If this does not start pen, insert dropper with tygon tube tip into top of reservoir and gently press rubber bulb to force ink through point.

Chart Drive

1. *Electric*

Electric clocks are self-starting, and require no maintenance.

2. *Spring Wound*

Wind clock every day (if 24-hour wind) when chart is changed, or every week (if 7-day wind). Exercise care to avoid over-winding clock. If clock has run down, it may not start after winding; this can be determined by noting whether balance wheel in the clock window is moving. If it is not, twist starter button counter-clockwise and release. For two speed drives, be sure 2-speed clutch screw is turned and locked hard in appropriate direction to obtain desired rotation rate.

Chart Plate

Should it become necessary to remove the chart plate for servicing, proceed as follows: Remove chart, push plate up until upper posts can be removed from bayonet holes, lower plate until lower spring posts can be removed from their bayonet holes, and remove plate taking care not to bend pen arms.

Movement

Occasionally check mechanism to be sure all pivots, links, etc. are pivoting freely. This is especially important in corrosive atmospheres.

Measuring Element

After recorder has been in service, it is well to check the element calibration occasionally. This may be "off test" due to accidental overranging, a mechanical shock on the case, or some other adverse factor.

1. *Temperature Elements*

Be sure to subject instrument bulb and test thermometer of proven accuracy to same conditions.

2. *Pressure Elements*

For pressure elements a precision gauge or a dead weight tester may be used to verify the indication of the pen arm.

In checking, try to obtain 3 points: one near each end of range, and one near center. Usually, if there is any discrepancy, a shift upscale or downscale will suffice. If the error is small, it can be corrected by using the micrometer screw on the pen arm. If error is large, loosen two screws on Bourdon swivel plate at the center of the spiral. Turn crank until pen is indicating properly and tighten screws. Make final adjustments with micrometer screw.

If error varies over the range, the range adjustment must be used. To make pen or indicator move a greater distance for the same temperature or pressure change, the Bourdon crank must be lengthened. To do this, loosen swivel plate screws one turn and turn micrometer screw on the crank forward. After each adjustment, tighten the two screws on the swivel plate so that pen indicates approximately correctly. Make final adjustment with micrometer screw. Check pen reading at three points per above description. Note whether pen moves too far or too little and repeat correction. By proceeding systematically in this fashion, the element can be brought into test.

For low pressure 5" diameter rubber diaphragm elements, the same procedure applies except that the swivel adjustment and

crank are at opposite ends of the output bracket. The swivel is at the end near the diaphragm center and is locked with a single screw. The crank length is adjusted by un-

locking the two screws at the right end of the output bracket, lengthening or shortening the crank and retightening the two screws.

REPLACEMENT OF COMPONENTS

After instrument has been in service for extended period, it may become necessary to replace components.

Door Assembly

It is often desirable to remove the door to service the instrument. Proceed as follows:

Open door. Insert pencil point or 1/8" drill through upper dust ledge and depress spring loaded hinge pin until it is disengaged from its bearing hole. Manipulate door so that it can be raised to disengage lower hinge pin. **CAUTION:** Save spacer washers which are strung on hinge pins. Sliding door stop is disengaged from the stop screw on the case by orienting the slot in the slide parallel to the flats on the stop screw.

Chart Drive

1. *Spring Wound*

Loosen two knurled nuts attached to leaf spring. Draw clock off mounting plate studs. Remove two screws in mounting plate. As chart hubs are not supplied with replacement clocks, remove hub by loosening the center screw and then unscrewing the hub.

2. *Electric*

Disconnect power. Detach lugs from terminal strip. Remove three clock mounting screws. Remove hub by loosening center screw and then unscrewing the hub.

Pen Point and Pen Arm

Pen point may be pulled from the pen arm as it is held in place by friction. Pen arm may be removed by loosening clamp screw at upper end and pulling pen arm off bracket.

Links

The ball pivot in the end of the link is retained in its bearing hole by means of the spring clip. This may be sprung open slightly to permit disengagement of the ball from its bearing hole.

Movement Bracket

The bracket swings on ball pivots attached to the crescent shaped arms. The bracket is retained top and bottom by a pair of similar shaped arms. These arms may be sprung slightly to disengage one bearing from its pivot and then the other. The bracket may then be removed.

Movement Post Assembly

Loosen single screw in base of post and remove.

Measuring Element

1. *Temperature*

Disconnect link at crank. Remove two mounting screws. Loosen nut holding element to bottom shelf. Loosen and remove cover plate, remove I Section rubber and slip out thermal element. Replace cover plate and rubber.

2. Pressure

a. Pressures to 2000 psi

Disconnect link at crank. Remove two mounting screws. Loosen compression nut holding capillary to connection. Remove element.

b. Pressures above 2000 psi

Same as for temperature element.

c. Low pressure rubber diaphragm element

Disconnect link at crank. Loosen compression nut holding capillary to case connection on bottom shelf. Using a small adjustable wrench, remove upper left-hand chart post from flange of element. Remove two other screws in flange and remove element.

RECORDER REPLACEMENT PARTS

CASE PARTS

AH-6065-AH	Cover plate (2)
K-803802	Mtg. screws (4) for each plate
AH-6079-M	L-bracket (4)
K-806703	Hex cap screw (4)
AH-500-I	Lockwasher (4)
AH-616-HA	Flat washer (4)
AH-98-DT	Door catch screw
AH-6292-A	Door catch roller
AH-106-CD	Door stop screw
CH-6090-M	Back plate
K-803804	Mtg. screws (3)
AH-6104-CK	Case connection, nickel plated brass, 1/4" NPT internal
AH-6104-CM	Case connection, 316 St. Stl., 1/4" NPT internal
AH-501-DC	Case connection locking nut

COMPLETE POST AND BRACKET ASSEMBLIES

Does not include pen arm and pen points, but does include mounting hardware.

Spec. 99010	One-pen Recorder
Spec. 99011	Two-pen Recorder
Spec. 99012	Three-pen Recorder
Spec. 99013	Four-pen Recorder

MOVEMENT POST ASSEMBLIES

AM-500-V	One pen
AM-500-AC	Two pen
AM-500-B	Three pen
AM-500-C	Four pen
K-803807	Post mounting screw 8-32x9-16
K-861700	Internal star washer #8

MOVEMENT BRACKETS

AM-501-L	One pen bracket (Red)
AM-501-K	2nd pen bracket (Green)
AM-501-I	3rd pen bracket (Purple)
AM-501-J	4th pen bracket (Black)

PEN ARMS

AP-500	Recorder Position 1, 2 & 3
AP-500-E	Recorder Position 4 (shortest)

PEN POINTS

BH-6076-B	V-pen for one pen recorder (inside pen on two pen recorder) (Red)
BH-6076-A	V-pen (outside pen on two pen recorders) (Green)
AH-6076-Q	Box pen (short, for one pen recorders) (Red)
AH-6076-R	Box pen (medium, for two pen recorders) (Green)
AH-6076-S	Box pen (long, for three pen recorders) (Purple)
AH-6076-T	Box pen (extra long, for four pen recorders) (Black)
AH-6076-M	Bottle reservoir pen (short, for one pen recorders) (Red)
AH-6076-N	Bottle reservoir pen (medium, for two pen recorders) (Green)
AH-6076-P	Bottle reservoir pen (long, for three pen recorders) (Purple)
AH-6076-O	Bottle reservoir pen (extra long, for four pen recorders) (Black)

INK 1-OZ. PLASTIC BOTTLES

AH-6110-C	Red
AH-6110-E	Green
AH-6110-F	Purple
AH-6110-G	Black

LINKS

Note: Measure distance between pivot centers.

ANN-2027	5-1/2" Link (Pos. 1 & 2).
ANN-2027-AL	5-1/2" Link over-under rider (Pos. 1 & 2)
ANN-2027-B	4" Link (Pos. 3 & 4)
ANN-2027-BK	4" Link over-under rider (Pos. 3 & 4)
ANN-2027-Y	4-25/32" Link Pressure Bellows Unit (Pos. 1)
ANN-2027-Z	6-7/32" Link Pressure Bellows Unit (Pos. 2)
ANN-2027-AW	4-23/32" Link Pressure Bellows Unit (Pos. 3)
ANN-2027-AV	3-9/32" Link Pressure Bellows Unit (Pos. 4)

IN ALL CORRESPONDENCE SPECIFY INSTRUMENT SERIAL NUMBER

ANN-207-Z	6-7/32" Link Vacuum Bellows Unit (Pos. 1)
ANN-207-Y	4-25/32" Link Vacuum Bellows Unit (Pos. 2)
ANN-207-AV	3-9/32" Link Vacuum Bellows Unit (Pos. 3)
ANN-207-AW	4-23/32" Link Vacuum Bellows Unit (Pos. 4)
ANN-207-FA	5-3/4" (twisted) for rubber diaphragm low pressure element Movement stop
AH-6185-B	Screw — 8-32x1/4
K-803802	Internal star washer #8
K-861700	

PRESSURE ELEMENTS

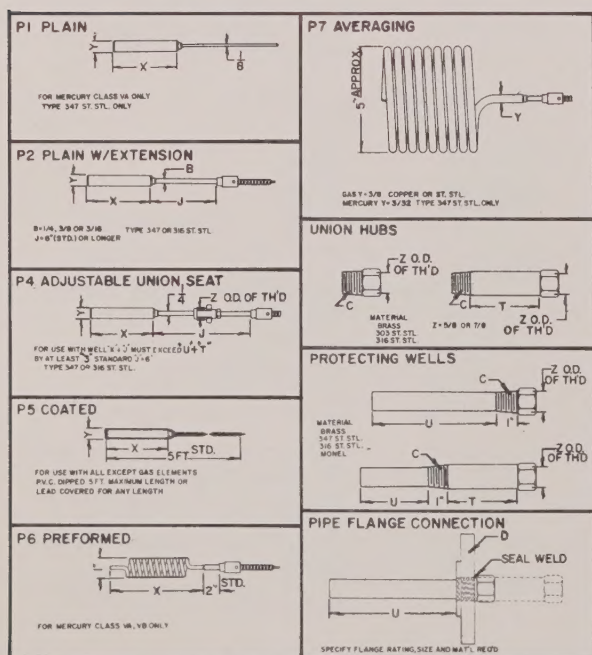
Specify the following when ordering:

1. Range (or chart number on which used).
2. Material of Bourdon (bronze, beryllium, copper or stainless steel).
3. Position in recorder (1, 2, 3 or 4 See instr. dwg.).
4. Serial number of instrument.

TEMPERATURE ELEMENTS

Specify the following when ordering:

1. Range and chart number on which used.
2. Actuating fluid — Mercury (M); Vapor (V); Organic Liquid (L); or Gas (G).
3. Position in recorder (1, 2, 3 or 4 See instr. dwg.).
4. Serial number of instrument.
5. Length of connecting capillary and type of armor.
6. Bulb description (one of the following):
 - a. Plain (no connection).
 - b. Union connection (give material, pipe size and length under thread).
 - c. Separable socket (give material, pipe size, i.d. of socket, and length under pipe thread).



ELECTRICAL OPERATION ELEMENTS

Specify the following when ordering:

1. Whether connected for series or parallel operation with equipment.
 - a. If series — what current range will be.
 - b. If parallel — voltage of device.
2. Position in recorder (1, 2, 3, or 4 See instr. drawing).
3. Serial number of instrument.

ELEMENT MOUNTING POSTS

AH-6074-CV	Spiral, bellows and electrical operation. Pos. 1 (2)
AH-6074-CW	Spiral, bellows and electrical operation. Pos. 2 (2)
AH-6074-CX	Spiral, bellows and electrical operation. Pos. 3 (3)
AH-6074-CY	Spiral, bellows and electrical operation. Pos. 4 (2)
K-803802	Element mounting screws (2)
AH-6074-AX	For low pressure rubber diaphragm element (3)
K-803808	Mounting screws (2)
AH-6074-DL	Short chart plate post

SPRING WOUND CLOCKS

	Wind	Rate
ANN-2037-G	24 hour	15 minute
ANN-2037-H	24 hour	24 minute
ANN-2037-I	24 hour	96 minute
ANN-2037-B	24 hour	2 hour
ANN-2037-F	24 hour	4 hour
ANN-2037-E	24 hour	12 hour
ANN-2037	24 hour	24 hour
ANN-2037-J	24 hour	24 hour
	2 speed	96 minute
ANN-2037-A	7 day	24 hour
ANN-2037-C	7 day	7 day
ANN-2037-D	2 speed	24 hour
AH-6074-CU		Mounting posts (2 req.)
K-803800		Mounting screws (2 req.)
AH-6125		Clock Key
AH-6228		Key mounting clip
K-810601		Mounting screw

ELECTRIC CLOCKS

	Rate	Voltage	Frequency
AH-6123-C	24 min.	115	60
AH-6123-N	96 min.	115	60
AH-6123-O	1 hour	115	60
AH-6123-E	2 hour	115	60
AH-6123-F	4 hour	115	60
AH-6123-G	6 hour	115	60
AH-6123-M	8 hour	115	60
AH-6123-A	12 hour	115	60
AH-6123	24 hour	115	60
AH-6123-H	24 hour	230	60
AH-6123-B	7 day	115	60
AH-6074-CZ		Mounting posts (3 req.)	
K-800410		Mounting screws (3 req.)	
		4-36x1-1/4	

For other rotations voltages and frequencies, please specify when ordering.

IN ALL CORRESPONDENCE SPECIFY INSTRUMENT SERIAL NUMBER

CHART HUB

ANN-2036-B Chart hub assembly including mounting screw

CHART PLATE AND PARTS

AH-6117-U Chart plate
ANN-2033-G Pen lifter assembly
K-810402 Mounting screws (2 req.)
AH-6074-CR Upper chart post
AH-6074-CQ Lower chart post
K-803802 Mounting screw 8-32x1/4
K-861700 Internal star washer #8

DOOR PARTS

Spec. 99003 Door assembly (complete)
AG-2-CD Round glass standard
AG-34-AY Round glass shatterproof
AH-6108-T Round glass gasket
NP-213 U. S. Gauge Escutcheon plate
ANN-2127-B Door handle and shaft assembly
AH-6082-E Hook cam
AH-1774-BL Wave washer
AH-616-GE Flat washer (strung on
AH-500-I Lock washer door shaft)
K-859005 Lock nut
AH-6070-R Hinge pins (2)
AH-202-BQ Hinge spring
AH-616-HB Hinge pin washer (2)
AH-6108-U Door gasket
ANN-2218 Skirt assembly
ANN-2218-A Skirt assembly for lighted cases
K-810601 Skirt mounting screws (6)

AH-6194-D Sliding door stop
K-810901 Door stop mounting screws (2)
AH-6228-S Bottle holder wireform
K-810800 Wireform mounting screw
AH-202-AZ Retaining spring for blind chart storage doors (2)
ANN-2022-E Cylinder lock assembly with key
AH-6125-E Key only, SAMA standard

ELECTRICAL PARTS (Misc.)

AB-711-C 3 point terminal strip
AB-711-E 8 point terminal strip
K-802804 Mounting screws (2 req.)
8-32x7/16
AH-500 Lock washers #8 (2 req.)
AH-6126 3 terminal marker strips
AH-6126-A 8 terminal marker strips
AB-1227-B Double pole single throw toggle switch
AB-1227 SPST toggle switch
AB-1228 Indicator plate
AH-6152-C Toggle switch mounting bracket
K-803802 Mounting screw (2 req.) 8-32x1/4
K-861700 Internal star washer #8 (2 req.)
ANN-2038-D Time operation solenoid unit series operation
AB-1215-A Series coil replacement
ANN-2038-E Time operation solenoid unit parallel operation (115 Volt 60 cycle).
AB-1215 Parallel coil replacement
K-803802 Mounting screw (2 req.) 8-32x1/4
K-861700 Internal star washer #8 (2 req.)

IN ALL CORRESPONDENCE SPECIFY INSTRUMENT SERIAL NUMBER

